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⑫ EUROPEAN PATENT APPLICATION

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⑰ Applicant: UNILEVER NV  
Burgemeester s'Jacobplein 1 P.O. Box 780  
NL-3000 DK Rotterdam(NL)

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⑰ Inventor: Yoell, Richard William  
2 Park Cottage Village Road  
Bromham Bedfordshire(GB)

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⑰ Representative: Litherland, Donald et al.  
UNILEVER PLC Patents Division P.O. Box 68 Unilever  
House  
London EC4P 4BQ(GB)

⑯ Improved flour.

⑯ The shelf-life of flour containing bran or other non-endosperm millings is improved by selectively suppressing enzyme activity in the non-endosperm components of the flour, especially by heat treatment. Grain may be heated, milled and the bran combined with flour extract from untreated grain.

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IMPROVED FLOUR

This invention relates to improved flour and flour compositions especially dry baking mixes, doughs and 5 batters and cooked products thereof, especially bread.

Highly refined flour consists of the endosperm of the grain, almost completely separated in the extraction process of milling from the remainder. The desirability 10 of retaining the separated, non-endosperm fractions of the grain in the diet is becoming widely acknowledged and accordingly the demand is increasing for wholemeal flour in which these fractions are recombined with the endosperm, and for wholemeal baked goods. Whereas 15 normally extracted flour has good shelf-life, the shelf-life of wholemeal flour is poor. This is attributable in large measure to the activity of lipolytic and proteolytic enzymes occurring almost exclusively in the non-endosperm fractions. The former reacts with 20 flour lipids to form peroxides which eventually impart off-flavours to the flour and the latter with protein in the endosperm, breaking it down and destroying its capacity to form gluten, the visco-elastic properties of which are essential for breadmaking.

Enzyme activity can be suppressed by heat treatment, but this produces an undesirable effect on the properties of flour by suppressing the activity of amylase enzymes. Amylase is found in the endosperm and breaks down 5 amylopectin and amylose to maltose and other carbohydrate fractions on which the yeast feeds in breadmaking, and also dextrins yielding flavour, texture and colour characteristics. Steam treatment of grain is described in BP 12736 with the object of improving extraction and the 10 quality of the flour, which is itself substantially unaffected by the treatment, the treatment merely conditioning the wheat.

British patents 332847 and 401941 disclose heat 15 treatment of wheat germ to remove enzyme activity in the absence of endosperm.

The present invention provides a flour composition including dietary fibre comprising an added non-endosperm 20 milled grain fraction which is characterised by the fact that the enzyme activity of the fraction is selectively suppressed.

The composition of the present invention therefore 25 comprises a mixture of conventionally extracted flour with unimpaired amylase activity, and a non-endosperm milled grain free from enzyme activity, the combination providing a composition which may contain all the components used in wholemeal flour but which exhibits substantially longer 30 shelf-life owing to the suppression of enzyme activity in the non-endosperm part of the flour.

The non-endosperm fractions may be recovered from grain which has been heated, preferably by steam, thereby 35 suppressing enzyme activity of both the endosperm and non-endosperm parts of the grain. Other methods of

suppressing enzyme activity in the grain may be used  
eg, heating especially in the micro- or infra-red range.  
The period and intensity of the treatment should be  
controlled to prevent any significant deterioration in the  
5 treated fractions. Treatment of separated non-endosperm  
components for this purpose is less convenient.

The flour recovered from the endosperm extract of the  
treated grain may be utilised as a thickening ingredient  
10 in soup mixes, its effectiveness being dependent upon the  
presence of amylopectin and amylose which remain intact  
with the suppression of enzyme activity. The endosperm  
component of the flour mixture according to the invention  
may be obtained at various levels of extraction including  
15 so-called patent flour and may be bread or other quality  
flour.

An important advantage of the present invention is  
that the composition it provides need contain no added  
20 ingredient such as salt which has in the past been added  
to confer improved shelf-life to flour.

The percentage of treated non-endosperm component  
which is combined with the flour extract may be varied  
25 from as low as 10% to as high as 25% or even higher. The  
compositions of the present invention may include part or  
all of the components of traditional milled feeds,  
including the wheat bran, middlings, mill run, shorts,  
wheat feed and germ meal. The components of the flour  
30 products of the invention may be derived from the same or  
different wheat sources and these may be so-called weak  
wheat for cakes and strong wheat for breadmaking.

The effective improvement in stability provided by  
35 the invention will of course depend upon the completeness  
or otherwise of the separation of wheat. Thus the flour

component being untreated will be less stable if it contains a residue of unseparated wheat bran and other enzyme-rich parts of the milled grain and as far as possible therefore these parts should be effectively separated from the flour.

5 The invention also provides a method of preparing wholemeal flour of improved shelf-life comprising milling 10 separate grain feedstocks, one of which is treated to suppress enzyme activity, and combining the flour extract from the untreated grain with the bran and other non-endosperm fractions from the treated grain. Preferably the treated grain is heated, eg, with steam.

15 Wholemeal flour by definition prescribed by law contains the entire composition of all the fractions recovered from milling and recombined and an important advantage of the present invention is that this requirement can be met in a product with much improved 20 shelf-life and without recourse to stabiliser additives. The invention also includes added materials customarily used in culinary mixtures containing flour, for example sugar, dried or whole eggs, leavening agents, flavouring and other conventional additives. Examples of mixtures 25 containing the flour composition of the invention include bread, scone and cake mixes, pizza and doughnut mixes and batters for cakes, pancakes and the like.

CLAIMS

1. Shelf-stable flour composition comprising a blend of extracted flour and dietary fibre comprising a non-endosperm milled grain fraction with suppressed enzyme activity.
2. Wholemeal flour composition according to Claim 1, which comprises the total non-endosperm extract from milled grain.
3. Composition according to Claim 1 or 2 comprising endosperm and non-endosperm fractions from separately milled and respectively heat-treated grain feedstock supplies.
4. Composition according to Claim 1, 2 or 3 which the percentage of the non-endosperm fraction is from 10 to 25%.
- 20 5. Shelf-stable flour composition as claimed in Claim 1 substantially as herein before described.
- 25 6. Culinary mixtures including improved flour as claimed in any of the preceding claims together with sugar and other conventional agents present in cake, bread and pizza mixtures, batters and doughnut mixes.
- 30 7. Method of preparing flour of improved shelf-life comprising milling separate grain feedstocks, one of which is heated to suppress enzyme activity, and combining the flour extract from the untreated grain with the non-endosperm fractions from the treated grain.

8. Method of preparing compositions comprising wholemeal flour according to Claim 7 wherein the total non-endosperm fraction milled from the heated, grain feedstock is recombined with 10 to 25% treated endosperm fraction.

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9. Method according to Claim 7 substantially as herein before described.

10. Flour - containing compositions wherever prepared by a method as claimed in Claims 7, 8 or 9.

11. Baked farinaceous goods including bread, cakes, pizzas and pancakes, prepared from a composition as claimed in Claims 1-6 and 10.



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⑰ Applicant: UNILEVER NV  
Burgemeester s'Jacobplein 1 P.O. Box 760  
NL-3000 DK Rotterdam(NL)

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⑲ Inventor: Yoeil, Richard William  
2 Park Cottage Village Road  
Bromham Bedfordshire(GB)

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㉑ Representative: Litherland, Donald et al,  
UNILEVER PLC Patents Division P.O. Box 68 Unilever  
House  
London EC4P 4BQ(GB)

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EUROPEAN SEARCH REPORT

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Application number

EP 83 30 5199

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. *)
A	FR-A-1 029 536 (CHRONOS-WERK REUTHER & REISERT) * Abstract; examples 1,2 *	1-11	A 21 D 6/00 A 23 L 1/172
A	US-A-3 615 674 (BASS et al.) * Claims 1-9 *	1-11	
D, A	GB-A- 332 847 (WANKLYN et al.) * Claims 1-8 *	1-11	
D, A	GB-A- 401 941 (WANKLYN) * Claims 1-4 *	1	
A	US-A-3 036 919 (KRETSCHMER et al.) * Claims 1-7 *	1	
A	GB-A- 428 620 (CRESSAL) * Claims 1-7 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. *)
A	US-A-2 509 449 (RAYMER et al.) * Claims 1-9 *	1	A 21 D A 23 L
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<p>The present search report has been drawn up for all claims</p>			
Place of search THE HAGUE	Date of completion of the search 10-03-1986	Examiner VAN MOER A.M.J.	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			